How have Recent Advances in Emission Estimation Methods and Models Improved Inventories of Primary PM and Precursor Gases that Form Secondary PM and Ozone?

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research and development

Science Question

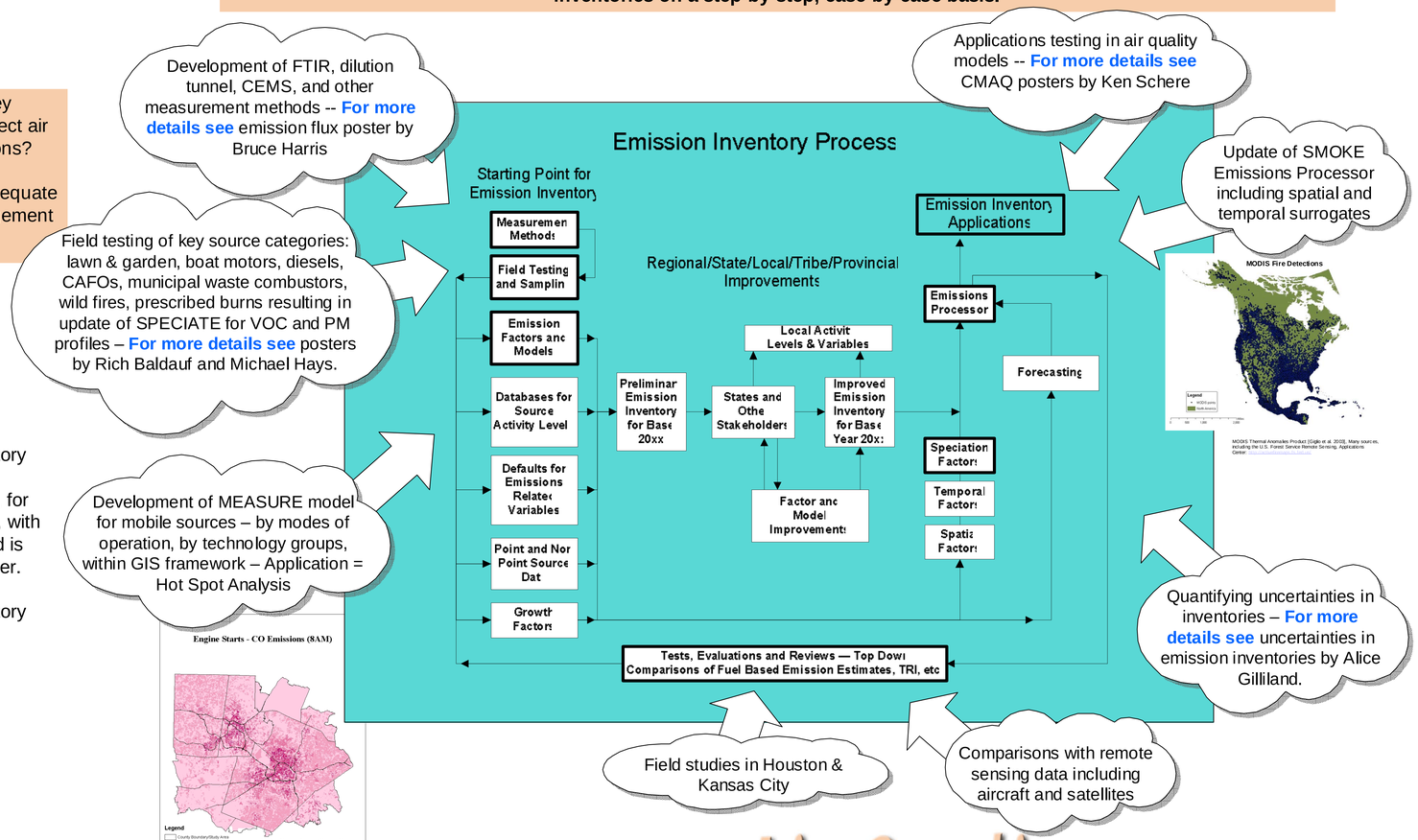
- What are emissions from key source categories which affect air quality management decisions?
- Are emission inventories adequate to support air quality management decisions?

Research Goals

- Produce an emission inventory that includes all significant emissions, from all sources, for all time periods, in all areas, with quantified uncertainties, and is accessible in a timely manner.
- Produce an emission inventory that is complete, accurate, timely, transparent, and affordable.

Methods/Approach

The general approach is to improve the underlying tools and techniques for completing and processing emission inventories on a step-by-step, case-by-case basis.



Results/Conclusions

- Biogenics – Quantifying biogenic emissions changed ozone control strategies from VOC to NOX focus. – For more details see Biogenics poster by Tom Pierce and Chris Geron.
- Mobile – Development of MEASURE changed mobile emission estimation approaches to modal approach for increased accuracy and resolution.
- NH3 – Characterization of NH3 emissions and emission patterns significantly improved air quality modeling of PM secondary organic aerosols.
- SPECIATE - Update of VOC and PM emission species profiles improved source receptor and air quality modeling capabilities.
- Fires – Improved characterization of the spatial and temporal location of open burning activities allows for modeling of PM and regional haze.
- Toxics – Measurement and characterization of toxic and hazardous air pollutants allowed for national and local assessment risks.
- Dyno/On-Road Engine Testing – Testing of heavy-duty, light-duty, and small, non-road engines significantly improved mobile source emission characterization.

Future Directions

Address NRC, CAAAC, and NARSTO* recommendations on emission inventories:

- Provide emissions and activity factors for priority source categories
- Improve speciation estimates
- Improve existing and develop new emission inventory tools/models
- Quantify and report uncertainty
- Increase inventory compatibility and comparability
- Improve user accessibility
- Improve timeliness
- Assess and improve emission projections

* NARSTO Assessment available Spring 2005

Impact and Outcomes

- Emission inventories provide foundation for cost-effective air quality management strategies.
  - ✓ Improvements in emission inventories have enabled better regulatory policy development for ozone, PM, and other important air programs.
- Influenced improvements in mobile source emissions models (MOBILE and design of MOVES).
- State Implementation Plans improved due to better understanding of emission inventories, meteorology, and atmospheric chemistry.

Air Quality